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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER

ART UNIT

PAPER NUMBER

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.  
**09/270,606**

Applicant(s)

**Evans**

Examiner

**Matt Anderson**

Group Art Unit

**1765**



☒ Responsive to communication(s) filed on 10/10/00

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claim

☒ Claim(s) 1-16 is/are pending in the application.

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 1-16 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☒ None of the CERTIFIED copies of the priority documents have been received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a))

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s) \_\_\_\_\_

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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## DETAILED ACTION

### *Claim Rejections - 35 U.S.C. § 112*

1. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The 'rate approximating a blanket polishing rate' as claimed does not particularly point out and distinctly claim the rate of polishing on the high structure areas.

### *Claim Rejections - 35 U.S.C. § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodera et al. (5,445,996) in view of Grover et al. and further in view of Burke et al. (US 5,934,978).

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Kodera et al. discloses a method for planarizing an insulating film using a aqueous slurry containing cerium oxide. In Fig. 22, the polishing of certain interconnect features (see col. 24 lines 45+) overlaid with  $\text{SiO}_2$  insulation is described. The recesses between the raised portions was seen to be polished at near a zero rate until the raised portions were reduced in height almost to that of the recesses with no polishing. Then, both portions were polished at virtually an identical rate. In Col. 44 lines 3-11 is disclosed the use of a surface active agent in the slurry.

Kodera et al. does not specifically disclose the use of ethylene glycol in such a slurry.

Grover et al. discloses a method of chemical mechanical polishing (CMP) using a slurry containing cerium oxide ( Col. 4 lines 40-45). The slurry also contains an additive (i.e. a modifier) comprised of a carboxylic acid. The method is disclosed as useful for STI (shallow trench isolation). STI is disclosed in Col. 1 lines 25-37 as follows: silicon nitride is deposited over a thermal oxide; a shallow trench is etched; a layer of oxide is deposited into the trench; the excess oxide is polished using CMP such that the surface is planar (i.e. the high spots are removed and the low spots are essentially untouched. In Col. 5 lines 60-63 the percentage of the metal oxide abrasive is disclosed as from about 2-25 % by weight. In Col. 7 lines 40-53 is described the methods of the enclosed Examples including the down force of 9 psi.

Burke et al. discloses in Cols. 3 and 4, lines 60+ and 1-9, respectively, the addition of a suspension agent which improves the colloidal behavior of the abrasive particles in deionized water and inhibits the coalescence of the particles. Ethylene glycol is disclosed as a suspension agent. In col. 4 lines 9-15, ceria (i.e. cerium oxide) is disclosed as the abrasive particles in the

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slurry. Those of ordinary skill in the art known that the terms surface active agent or surfactant are equivalent to the term suspension agent.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the references cited because Kodera et al. discloses a CMP process where the ceria containing slurry polishes the high spots at a nearly constant rate while the low spots are virtually untouched, Grover et al. adds known process parameter data to the mix, and Burke et al. discloses the use of several suspension agent which would help the colloidal particles of ceria stay in the aqueous solution and not coalesce, and because such a combination would have been anticipated to produce an expected result.

In regard to claims 1, 10-11, 14, 16 it would have been obvious to one of ordinary skill in the art at the time of the present invention to form a slurry containing ceria, use that the ceria containing slurry to polish the high spots of a  $\text{SiO}_2$  structure at a nearly constant rate while the low spots are virtually untouched because such a method is described by Kodera et al. and such a method would have been anticipated to produce an expected result.

In regard to claims 2-9, 12 it would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the process parameters of cerium oxide (ceria) concentration between 1%-50% weight and polishing pressure between 5-10 psi because these components of a both a polishing slurry and a polishing process were known in the art (Grover et al.) and such optimization would have been achieved with only routine experimentation.

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In regard to claims 4, 7, 8, 15 it would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the amount of ethylene glycol in such a slurry because the addition of ethylene glycol in a ceria-containing CMP slurry to affect the suspension and ultimately the polishing of the slurry was known, such optimization would have been anticipated to produce an expected result, and such optimization would have been achieved with only routine experimentation.

***Conclusion***

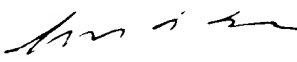
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matt Anderson whose telephone number is (703) 308-0086. The examiner can normally be reached on Monday-Thursday from 6:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are not successful, the examiner's supervisor, Benjamin Utech, can be reached at (703) 308-3836.

Any inquiry of a general nature can be directed to the group receptionist whose telephone number is (703) 308-0661.

MAA

November 2, 2000

  
BENJAMIN L. UTECH  
SUPERVISORY PATENT EXAMINER  
TECHNICAL CENTER